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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/620,832	07/16/2003	Esin Gulari	10114-015	1263

7590 03/03/2006  
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EXAMINER

SANDERS, KRIELLION ANTIONETTE

ART UNIT	PAPER NUMBER
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1714

DATE MAILED: 03/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/620,832

Applicant(s)

GULARI ET AL.

Examiner

Kriellion A. Sanders

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 2/15/05.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

### DETAILED ACTION

Applicant's arguments with respect to claims 1-16 have been considered but are moot in view of the new ground(s) of rejection.

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1- 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Manke et al., US Patent No. 6469073 in view of Clere PG Pub 20020006511 and Serhatkulu et al.

2. Applicant's invention pertains to a method of delaminating a graphite structure comprising:

a. Diffusing a coating agent in a supercritical fluid between layered particles of a graphite structure, wherein the coating agent comprises a polymer

- i. an oligomer
- ii. a monomer
- iii. an oil
- iv. a mixture of the above

Wherein the supercritical fluid comprises

- (1) Carbon dioxide

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- (2) Ammonia
- (3) Methane
- (4) Ethane
- (5) Ethylene
- (6) A mixture of the above

b. Depressurizing the supercritical fluid to form delaminated graphite particles.

c. Applicant further claims a step for mixing the delaminated particles with a polymer. Suitable graphites include natural graphite, synthetic graphite and expandable graphite.

Delamination is defined as the flaking-off of a coating from the substrate.

Manke et al discloses a method of delaminating a layered silicate to provide improved mechanical properties to select materials such as polymers. The method includes providing particles of the layered silicate and a supercritical fluid. The method further includes contacting the layered silicate particles with the supercritical fluid to define contacted layered silicate particles and catastrophically depressurizing the contacted layered silicate particles to exfoliate the layered particles so that the layered particles are substantially dispersed, defining treated silicate particles. See col. 3, line 26 through col. 5, line 64.

Clere PG Pub 20020006511 discloses that hexagonal boron nitride is an inert, lubricious ceramic material having a plate-like hexagonal crystalline structure (similar to that of graphite). The invention also relates to a method of making delaminated boron nitride powder. This method involves providing boron nitride powder and milling the boron nitride powder in a mixture including a milling media and a milling liquid under conditions effective to produce

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delaminated boron nitride powder. The milling liquid may be water, methanol, ethanol, propanol, butanol, isomers of low molecular weight alcohols, acetone, and supercritical CO<sub>2</sub>. In situations in which high aspect ratio h-BN is desired, milling times of between 8 and 48 hours are preferred and the milling temperature is no more than about 30.degree. C.

Clere has established a delamination process for a particulate inorganic material, (BN), using a milling liquid such as supercritical CO<sub>2</sub>. Clere has further established that the BN of his invention possess hexagonal crystalline structure (similar to that of graphite), it would be obvious to one of ordinary skill in the art to utilize a supercritical fluid in a process for delamination graphite. Therefore, the ordinary practitioner in this art would look to Manke et al for a specific process for delamination utilizing a supercritical fluid. See paragraph 12 through paragraph 31.

Serhatkulu teaches a method of delaminating an organically modified clay prior to formation of a polymeric nanocomposite. The process of Serhatkulu relates to the use of CO<sub>2</sub> soluble additives to coat delaminated clay surfaces during supercritical process treatment to prevent the collapse of layered structures after depressurization of carbon dioxide.

It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to utilize the delamination process of Serhatkulu to delaminate other particulate inorganic substances such as graphite. This is supported by Clere which has established a delamination process for a particulate inorganic material, (BN, which has been equated to graphite), using a milling liquid such as supercritical CO<sub>2</sub>.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kriellion A. Sanders whose telephone number is 571-272-1122. The examiner can normally be reached on Monday through Thursday 6:30-7:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasu Jagannathan can be reached on 571-272-1119. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Kriellion A. Sanders  
Primary Examiner  
Art Unit 1714

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